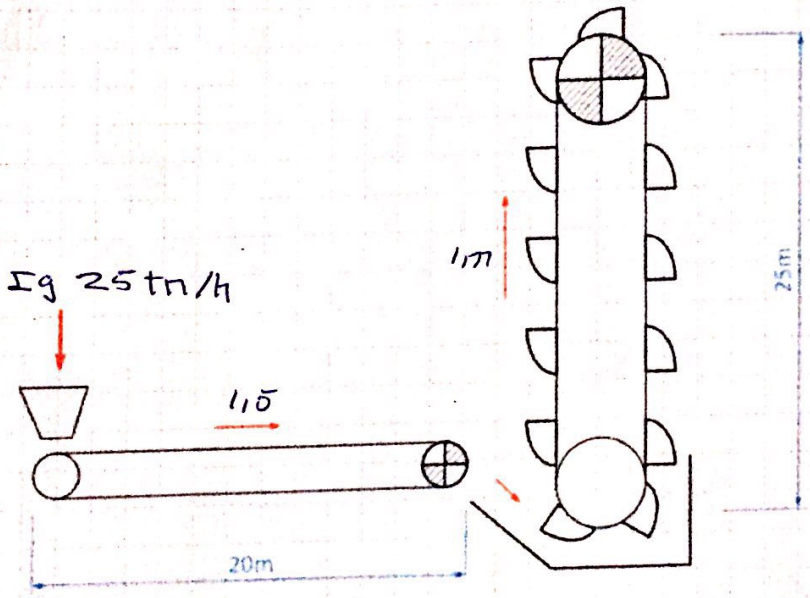
Se desea transportar 25 tn por hora de trigo mediante el sistema de la siguiente figura.
Se tienen los siguientes datos:

Cinta

$a_o = 1m$
$a_u = 3m$
$v = 1,5\ m/s$
$z = 4$
$l = 20$

Cangilon

$\varphi = 0,8$
$V_B = 2,24\ dm^3$
$v = 1m/s$
$h = 75m$
$a_t = 60cm$
$f_{ges} = 0,3$
$\eta_t = 0,8$



Resolucion

de tablas

$\beta_{trigo} = 35°$ y $\gamma = 0,75\ tn/m^3$

$$I_g = I_v \cdot \gamma \Rightarrow I_v = \frac{I_g}{\gamma} = \frac{25\ \frac{tn}{h}}{0,75\ \frac{tn}{m^3}}$$

$$I_v = 33,33\ \left(\frac{m^3}{h}\right)$$

Para el calculo del ancho de Banda.

$$Iv = 3600 \cdot v \cdot A \cdot K$$

$$A = \frac{Iv}{3600 \cdot v \cdot K} = \frac{33,33}{3600 \cdot 1,5 \cdot 1} \Rightarrow A = 0,006\ (m^2)$$

Para Banda Plana

$$A = \frac{1}{4} b^2 tg\beta \Rightarrow b = \sqrt{\frac{4A}{tg\beta}} = \sqrt{\frac{4 * 0,006}{tg\ 35}} \Rightarrow b = 0,18\ (m)$$

$$b = 0,9B - 0,05 \Rightarrow B = \frac{b + 0,05}{0,9} \Rightarrow \frac{0,18 + 0,05}{0,9}$$

$B = 0,26\ (m) \Rightarrow$ Normalizando $\boxed{B = 400\ (mm)}$

$$Fu = f_{ges} \cdot L \cdot g \left(G_m + \frac{I_G}{3,6\,v}\right) \pm \frac{I_G \cdot H \cdot g}{3,6\,v}$$

$G_m = 2G_B + G_{ro} + G_{ru}$; $f_{ges} = f \cdot C$.

+. Δ1 Pg 58

$$G_B = 5,8 \frac{Kg}{m^2} * 0,4\,m \Rightarrow G_B = 2,32 \frac{Kg}{m}$$

de +. Δ7 Pg 60 3,7 Kg

$$G_{ro} = \frac{3,7}{a_o} = \frac{3,7}{1} \Rightarrow G_{ro} = 3,7 \frac{Kg}{m}$$

$$G_{ru} = \frac{3,7}{a_u} = \frac{3,7}{3} \Rightarrow G_{ru} = 1,23 \frac{Kg}{m}$$

$\Rightarrow G_m = 2(2,32) + 3,7 + 1,23 \Rightarrow \boxed{G_m = 9,67 \frac{Kg}{m}}$

$$Fu = 0,3 * 20 * 9,81 \left(9,67 + \frac{25}{3,6 \cdot 15}\right)$$

$\boxed{Fu = 841,67\ (N)}$

$$N_{acc} = \frac{Fu \cdot v}{\eta} = \frac{841,67 \cdot 15}{0,8} \Rightarrow \boxed{N_{acc} = 1578,14\ W}$$

$D_T = x \cdot z$; KN

$$D_T = \frac{360 \cdot Fu}{P \cdot \pi \cdot a \cdot B_m}$$ Palgodon (20 a 40) KN/m²

Auxiliar: Sotelo Zurita Israel

Calculo y Dimencionado del Cangilon

con $V_B = 7,4\ dm^3$ de la tabla 3,5 - Pag 36

ancho $b_B = 250\ (mm)$ espesor 1,5 $\Rightarrow G_C = 1,40\ Kg$

Largo $e_B = 160\ (mm)$

alto $h_B = 170\ (mm)$

Calculo del Paso

$$I_V = 3,6 \cdot v \cdot \frac{V_B}{t_B} \cdot \varphi \Rightarrow t_B = \frac{3,6 \cdot v \cdot V_B \cdot \varphi}{I_V}$$

$$t_B = \frac{3,6 \cdot 1 \cdot 2,24 \cdot 0,8}{33,33} \Rightarrow t_B = 0,193\ (m)$$

$t_B > h_B$

193mm > 170mm cumple

$$N_{acc} = \frac{F_U \cdot v}{\eta}$$

$$F_U = f_{ges} \cdot g \cdot H\,(q + G_g) + G_g \cdot H \cdot g$$

$$q = G_B + G_C$$

ancho de Banda del cangilon

$B = b_B + (30 \ldots 100)(mm)$ 50

$B = 250 + 50 \Rightarrow 300\ (mm)$

Normalizando $\Rightarrow$ $\boxed{B = 315}$ mm Pg 28

Pg 58

$$G_B = 5,8\ \frac{Kg}{m^2} * 0,315\ m \Rightarrow \boxed{G_B = 1,827\ \left(\frac{Kg}{m}\right)}$$

$$q = 1,827\ \frac{Kg}{m} + \frac{1,4\ Kg}{0,143\ m} \Rightarrow q = 9,0,8\ \frac{Kg}{m}$$

$$G_g = \frac{I_G}{3,6 \cdot v} = \frac{25}{3,6 \cdot 1} \Rightarrow G_g = 6,944$$

Auxiliar: Sotelo Zurita Israel

$$Fu = 0{,}3 \cdot 9.81 \cdot 25 \ (9{,}08 + 6{,}94) + 6{,}94 \cdot 25 \cdot 9{,}81$$

$$Fu = 3816{,}58 \ (N)$$

$$Nacc = \frac{3816{,}58 \cdot 1}{0{,}8} \Rightarrow 4770{,}72 \ (N)$$

- $Nacc\ total = Nacc_{cinta} + Nacc_{cangilon}$

tipo de descarga:

Centrifuga
$l \leq ri$

gravedad
$l > ra$

$$l = \frac{895}{n^2}$$

$$n = \frac{60 \cdot v}{\pi \cdot D} = \frac{60 \cdot 1}{\pi \cdot 0{,}6} \Rightarrow 31{,}83$$

$$l = \frac{895}{31{,}83^2} = 0{,}88 \ (m)$$

$ri = 0{,}3 \ m$

$ra = 0{,}3 \ m + eB = 0{,}3 + 0{,}16 = 0{,}46 \ (m)$

$0{,}88 \ m > ra = 0{,}46 \ (m)$ ∴ Descarga por gravedad.

DATOS

$I_g = 96\ tn/h$

$\gamma = 2\ tn/m^2$

$a_K = 50 - 150\ [mm]$

$v = 0,5\ m/s$

$f_{ges.} = 0,35$

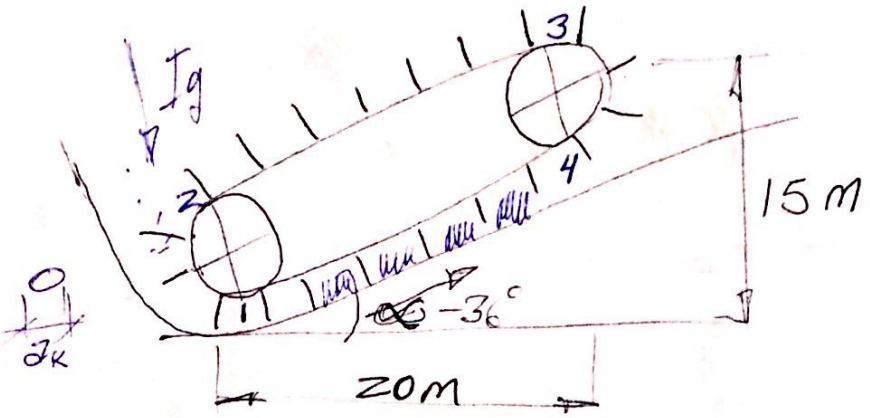
$z = 8$

2 cadenas

Dim. B, h, t_K

$F_u = ?$

$F_1 ; F_2 ; F_3 ; F_4$



SOLUCIÓN

$I_G = \gamma I_V \rightarrow I_V = \frac{I_g}{\gamma} = \frac{96}{2} = \frac{\frac{tn}{h}}{\frac{tn}{m^3}} \rightarrow \boxed{I_V = 48\ m^3/h}$

$I_V = 3600\ v \cdot K \cdot A \qquad K = 0,59$ "2 cadenas"

$A = \frac{I_V}{3600 \cdot v \cdot K} = \frac{48}{(3600)(0,5)(0,59)} \rightarrow A = 0,045\ [m^2]$

$A = B\,h \cdot \varphi \ldots (1)$ factor de arrastre (pag 22)

$\boxed{\varphi = 0,75}$

$m = \frac{B}{h} = (2,4\ (3) - 4)$ → pag 23

$\frac{B}{h} = 3 \rightarrow B = 3h \ldots (2)$

$\boxed{h = 0,14\ m}$

reemplazar (2) en (1)

$A = 3h \cdot h\,\varphi \rightarrow h = \sqrt{\frac{A}{3\varphi}} = \sqrt{\frac{0,045}{(3)(0,75)}}$

$B = 3h = (3)(0,14) \rightarrow \boxed{B = 0,42\,(m)}$

pag 43 $L_T = t_K = (3 \text{ a } 6)\,h$ paso (dist entre rastras)

$t_K = 3\,(0,14) \rightarrow \boxed{t_K = 0,42}$

$B \geq f_K \cdot a_K$ → pag 23

$(3) \cdot (75)$

$420\ mm \geq 225\ mm$

Pag 24 $\boxed{F_{min} = F_2 = (3 \text{ a } 10)\ KN}$

$\boxed{F_2 = 5\ KN}$

Pag 25 $F_1 = 1,1\ F_2 = (1,1)(5) \rightarrow \boxed{F_1 = 5,5\ KN}$

$F_4 = F_1 + \underbrace{L_g\,(f_g\,G_g + f_r\,q)}_{\text{horizontal}} + \underbrace{H_g\,(G_g + q)}_{\text{vertical}}$ (analisis)

Pag 24: $f_g = 0,6$

$f_r = 0,25$

$G_g = \dfrac{I_q}{3,6\,v} = \dfrac{96}{(3,6)(0,5)} \rightarrow G_g = 53,33$

$q = \Psi\,G_g = (0,7)(53,33) \rightarrow q = 37,33$

Ψ ← Pag 24

2 cadenas → 0,7

$F_4 = 5500 + (20)(9,81)\left[(0,6)(53,33) + (0,25)(37,33)\right] +$

$+ (15)(9,81)(53,33 + 37,33)$

$\boxed{F_4 = 26949,66\ (N)}$

$$F_2 = F_3 + L \cdot g(f_r \cdot q) - H g q$$

$$F_3 = F_2 - L g (f_r q) + H g q$$

fza sin carga

$$= 5000 - (20)(4.81)(0,25)(37,33) + (15)(4.81)(37,33)$$

$$\boxed{F_3 = 8662,073\ (N)}$$

finalmente

$$F_U = F_4 - F_3 = 26949,86 - 8662.073$$

$$\boxed{F_U = 18287,59\ (N)}$$